CLAIMS:

1. A method of restoring phase information on radiations transmitted through an object on the basis of detection data obtained by detecting intensity of the radiations transmitted through the object, said method comprising the steps of:

(a) obtaining plural sets of detection data respectively representing plural kinds of radiation image information on a detection plane at a predetermined distance from the object by using plural radiations having different wavelengths with energy from 16 keV to 30 keV to detect intensity of the plural radiations on said detection plane; and

(b) restoring phase information on the radiations transmitted through the object on the basis of said plural sets of detection data so as to obtain phase data.

2. A method according to claim 1, further comprising the step of generating image data on the basis of the phase data obtained at step (b).

3. A method of restoring phase information on a radiation transmitted through an object on the basis of detection data obtained by detecting intensity of the radiation transmitted through the object, said method comprising the steps of:

(a) obtaining plural sets of detection data respectively representing plural kinds of radiation image information on plural detection planes at different distances from the object by using a radiation having a predetermined wavelength with energy from 16 keV to 30 keV to detect intensity of the radiation on said plural detection planes; and

(b) restoring phase information on the radiation transmitted through the object on the basis of said plural sets of detection data so as to obtain phase data.

4. A method according to claim 3, further comprising the step of generating image data on the basis of the phase data obtained at step (b).

5. A method of restoring phase information on a radiation transmitted through an object on the basis of detection data obtained by detecting intensity of the radiation emitted from a radiation source having a focal spot size σ in a position at a distance R from the object and transmitted through the object, said method comprising the steps of:

(a) obtaining plural sets of detection data respectively representing plural kinds of radiation image information on plural detection planes at different distances z_i from the object by using a radiation detector for detecting intensity of applied radiation on said plural detection planes to generate a detection signal representing radiation image information in which a pixel size is not less than $\pi\sigma z/3R$, where z is a maximum value of z_i; and

(b) restoring phase information on the radiation transmitted through the object on the basis of said plural sets of detection data so as to obtain phase data.

6. A method according to claim 5, further comprising the step of generating image data corresponding to image brightness on the basis of the phase data obtained at step (b).

7. A method of restoring phase information on a radiation transmitted through an object on the basis of detection data obtained by detecting intensity of the radiation emitted from a radiation source having a focal spot size σ in a position at a distance R from the object and transmitted through the object, said method comprising the steps of:

(a) acquiring plural sets of first detection data respectively representing plural kinds of radiation image information on plural detection planes at different distances z_i from the object, said plural sets of first detection data being obtained by detecting intensity of the radiation on said plural detection planes;

(b) respectively generating plural sets of second detection data by suppressing spatial frequency components larger than $3R/2\pi\sigma z$ with respect to said plural sets of first detection data, where z is a maximum value of z_i; and

(c) restoring phase information on the radiation transmitted through the object on the basis of said plural sets of second detection data so as to obtain phase data.

8. A method according to claim 7, further comprising the step of generating image data corresponding to image brightness on the basis of the phase data obtained at step (c).

9. An apparatus for restoring phase information on radiations transmitted through an object on the basis of detection data obtained by detecting intensity of the radiations transmitted through the object, said apparatus

comprising:

a radiation source for emitting each of plural radiations having different wavelengths with energy from 16 keV to 30 keV;

detecting means for detecting intensity of the radiation emitted from said radiation source and transmitted through the object so as to obtain detection data representing radiation image information; and

phase data calculating means for restoring phase information on the radiations having different wavelengths and transmitted through the object on the basis of plural sets of detection data obtained by detecting intensity of the plural radiations so as to obtain phase data.

10. An apparatus according to claim 9, further comprising image constructing means for generating image data on the basis of the phase data obtained by said phase data calculating means.

11. An apparatus for restoring phase information on a radiation transmitted through an object on the basis of detection data obtained by detecting intensity of the radiation transmitted through the object, said apparatus comprising:

a radiation source for emitting a radiation having a predetermined wavelength with energy from 16 keV to 30 keV;

detecting means for detecting intensity of the radiation emitted from said radiation source and transmitted through the object so as to obtain detection data representing

radiation image information;

driving means to be used for changing a distance between the object and said detecting means; and

phase data calculating means for restoring phase information on the radiation transmitted through the object on the basis of plural sets of detection data obtained by detecting intensity of the radiation at different distances so as to obtain phase data.

12. An apparatus according to claim 11, further comprising image constructing means for generating image data on the basis of the phase data obtained by said phase data calculating means.

13. An apparatus for restoring phase information on a radiation transmitted through an object on the basis of detection data obtained by detecting intensity of the radiation, which has been emitted from a radiation source having a focal spot size σ in a position at a distance R from the object and transmitted through the object, on plural detection planes at different distances z_i from the object, said apparatus comprising:

detecting means for detecting intensity of applied radiation so as to obtain detection data representing radiation image information in which a pixel size is not less than $\pi\sigma z/3R$, where z is a maximum value of z_i; and

phase data calculating means for restoring phase information on the radiation transmitted through the object on the basis of plural sets of detection data obtained by

detecting intensity of the radiation at different distances z_i so as to obtain phase data.

14. An apparatus according to claim 13, further comprising image generating means for generating image data corresponding to image brightness on the basis of the phase data obtained by said phase data calculating means.

15. An apparatus for restoring phase information on a radiation transmitted through an object on the basis of detection data obtained by detecting intensity of the radiation, which has been emitted from a radiation source having a focal spot size σ in a position at a distance R from the object and transmitted through the object, on plural detection planes at different distances z_i from the object, said apparatus comprising:

signal processing means for respectively generating plural sets of second detection data by suppressing spatial frequency components larger than $3R/2\pi\sigma z$ with respect to plural sets of first detection data obtained by detecting intensity of the radiation at different distances z_i, where z is a maximum value of z_i; and

phase data calculating means for restoring phase information on the radiation transmitted through the object on the basis of said plural sets of second detection data generated by said signal processing means so as to obtain phase data.

16. An apparatus according to claim 15, further comprising image generating means for generating image data

corresponding to image brightness on the basis of the phase data obtained by said phase information calculating means.

17. A program for restoring phase information on radiations transmitted through an object on the basis of detection data obtained by emitting the radiations from a radiation source and detecting intensity of the radiation transmitted through the object, said program actuating a CPU to execute the procedures of:

controlling said radiation source to emit each of radiations having different wavelengths with energy from 16 keV to 30 keV;

obtaining a Laplacian of phase on the basis of plural sets of detection data obtained by detecting intensity of the radiations having different wavelengths; and

obtaining phase data of the radiation by performing inverse Laplacian computation on the Laplacian of phase.

18. A program for restoring phase information on a radiation transmitted through an object on the basis of detection data obtained by emitting the radiation from a radiation source and detecting intensity of the radiation transmitted through the object, said program actuating a CPU to execute the procedures of:

controlling said radiation source to emit a radiation having a predetermined wavelength with energy from 16 keV to 30 keV;

obtaining a Laplacian of phase on the basis of plural sets of detection data obtained by detecting intensity of

the radiation at different distances; and

obtaining phase data of the radiation by performing inverse Laplacian computation on the Laplacian of phase.

19. A program for restoring phase information on a radiation transmitted through an object on the basis of detection data obtained by detecting intensity of the radiation emitted from a radiation source having a focal spot size σ in a position at a distance R from the object and transmitted through the object, said program actuating a CPU to execute the procedures of:

obtaining plural sets of detection data respectively representing plural kinds of radiation image information on plural detection planes at different distances z_i from the object by using a radiation detector for detecting intensity of applied radiation on the plural detection planes to generate a detection signal representing radiation image information in which a pixel size is not less than $\pi\sigma z/3R$, where z is a maximum value of z_i; and

obtaining a Laplacian of phase on the basis of said plural sets of detection data; and

obtaining phase data of the radiation by performing inverse Laplacian computation on the Laplacian of phase.

20. A program for restoring phase information on a radiation transmitted through an object on the basis of detection data obtained by detecting intensity of the radiation emitted from a radiation source having a focal spot size σ in a position at a distance R from the object and transmitted through the

object, said program actuating a CPU to execute the procedures of:

acquiring plural sets of first detection data obtained by detecting intensity of the radiation on plural detection planes at different distances z_i from the object;

respectively generating plural sets of second detection data by suppressing spatial frequency components larger than $3R/2\pi\sigma z$ with respect to said plural sets of first detection data, where z is a maximum value of z_i;

obtaining a Laplacian of phase on the basis of said plural sets of second detection data; and

obtaining phase data of the radiation by performing inverse Laplacian computation on the Laplacian of phase.